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Upland Hatchery General Permit  
Issuance Date: April 22, 2005  
Effective Date: June 1, 2005  
Expiration Date: June 1, 2010

**UPLAND FIN-FISH HATCHING AND REARING  
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM  
WASTE DISCHARGE GENERAL PERMIT**

State of Washington  
DEPARTMENT OF ECOLOGY  
Olympia, Washington 98504-7600

In compliance with the provisions of  
The State of Washington Water Pollution Control Law  
Chapter 90.48 Revised Code of Washington as amended  
and  
The Federal Water Pollution Control Act as amended  
(The Clean Water Act)  
Title 33 United States Code, Section 1251 et seq.

Until this permit expires, is modified or revoked, Permittees that have properly obtained coverage by this permit are authorized to discharge to waters of the state in accordance with the special and general conditions that follow.



David C. Peeler, Manager  
Water Quality Program  
Washington State Department of Ecology

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**SUMMARY OF PERMIT REQUIRED DOCUMENTS**

<b>Permit Section</b>	<b>Requirement</b>	<b>Submission Frequency</b>	<b>Submitted to the Department</b>	<b>Submittal Date</b>
S4.H.1	Monthly Discharge Monitoring Report	Report Quarterly	Yes	30 <sup>th</sup> day after each quarterly reporting period
S4.H.2	Disease Control Chemical Use Report	Report Annually	Yes	By January 30 <sup>th</sup> of the following calendar year, with the DMR. Records to be made available to the Department on a more frequent basis upon request.
S4.A.	Facility Sampling Plan	1/permit cycle. Updates submitted as necessary	Yes	By January 1, 2006
S4.F.	Operational Log	Not submitted	No	Not submitted. Records to be made available to the Department upon request.
S6.C.	Solid Waste Management Plan	1/permit cycle. Updates submitted as necessary	Yes	By January 1, 2006
S7.	Pollution Prevention Plan	1/permit cycle. Updates submitted as necessary	Yes	By January 1, 2006
G17.	Application for permit renewal	1/permit cycle	Yes	By December 1, 2009

## **SPECIAL CONDITIONS**

### **S1. PERMIT COVERAGE**

#### **A. Who Needs Permit Coverage?**

1. Every upland fin-fish hatching or rearing facility within the jurisdiction of the Department of Ecology which discharges at least 30 days a year, and:
  - a. Has a production of more than 20,000 pounds of fish a year; or
  - b. Which feeds more than 5,000 pounds of fish food in any one calendar month; or
  - c. Is determined by the Department to be a significant contributor of pollution to waters of the state. In making this designation, the Department shall consider the following factors:
    - (i) The location, quantity, and quality of the receiving waters of the state;
    - (ii) The holding, feeding, and production capacities of the facility;
    - (iii) The quantity and nature of the pollutants reaching waters of the state; and
    - (iv) Other relevant factors (40 CFR 122.24).
2. Facilities that discharge to a TMDL-assessed waterbody or a waterbody listed on the 303(d) list in the Washington State Water Quality Assessment Section 303(d) Report will be evaluated on a case-by-case basis for individual permit coverage.

#### **B. Facilities Excluded from Coverage**

1. The Department of Ecology will not provide coverage under this general permit when:
  - a. The facility discharges to a water body with a Total Maximum Daily Load (TMDL) water clean-up plan or other control plan unless this general permit is adequate to provide the level of protection required by the TMDL or control plan.
  - b. New facilities or existing facilities with expansions, production increases, or process modifications which will result in new or substantially increased discharges of pollutants or a change in the nature of the discharge of pollutants that discharge to a water body listed pursuant to Section 303(d) of the Clean Water Act unless the Permittee complies with applicable Surface Water Quality Standards (WAC173-201A) at the point of discharge.

2. Facilities which do not meet the definition for an Upland Fin-fish facility. This includes marine and freshwater net pens located within waters of the state, and facilities used to rear fish in waters of the state, which are not located in an upland setting. (Chapter 173-221A WAC)
3. Facilities operating without coverage under this General Permit (e.g. those exempt according to the conditions in S1.A.) shall meet the discharge standards in WAC 173-221A, including numeric discharge limits and solid waste management, and shall not violate the State Water Quality and Ground Water Standards (Chapters 173-200 and 201A).

C. How Can Coverage Be Obtained?

1. For New Facilities which propose to begin activities which will result in a discharge or potential discharge to waters of the state on or after the effective date of this general permit:
  - a. Notify the Department by submission of a completed application form requesting coverage under this permit at least 180 days prior to the planned activity that will result in the discharge to waters of the state.
  - b. The applicant will publish twice in a local newspaper of general circulation a notice that an application for coverage has been made pursuant to Section 173-226-130(5) WAC. This notice shall specify the last day of the 30-day public comment period.
  - c. At the end of the 30-day comment period, the Department will accept the application and review all comments prior to making a determination on whether to grant general permit coverage.
  - d. The Department intends to notify applicants by mail of their status concerning coverage under this permit. If the applicant does not receive notification of the coverage decision from the Department, coverage under this permit will commence on the 31<sup>st</sup> day following the Department's acceptance of the application form.
2. For Existing Facilities Requiring Renewal of Coverage:
  - a. Notify the Department by submitting a completed application form 180 days prior to permit expiration.
  - b. Unless the Department responds in writing to the notification, coverage of a discharger under this permit will commence on the effective date of the permit.

## S2. DISCHARGE LIMITATIONS

### A. Process Wastewater Discharges

All discharges and activities authorized by this permit shall be consistent with the terms and conditions of this permit.

Beginning on the effective date of this permit and lasting through the expiration date, the Permittee is authorized to discharge the following wastestreams at the permitted locations, as specified in the site specific Sampling Plan (S4.A) subject to complying with the following limitations. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit shall constitute a violation of the terms and conditions of this permit.

### B. Rearing Pond or Raceway Discharges

Flow-Through Settling Rearing Pond or Raceway Discharges, and all other discharges except Offline Settling Basin Discharges and Rearing Pond or Raceway Drawdown for Fish Release Discharges.

Parameter	Monthly Average	Instantaneous Maximum
Settleable Solids (SS) (net <sup>1</sup> mL/L)	0.1	--
Total Suspended Solids (TSS) (net <sup>1</sup> mg/L)	5.0	15.0

<sup>1</sup> Net values apply when influent and effluent solids are comparable (see Section S4.A). Net values will be accepted if both influent and effluent values are reported on the DMR.

### C. Offline Settling Basin Discharges

Parameter	Monthly Average	Instantaneous Maximum
Settleable Solids (mL/L)	--	1.0
Total Suspended Solids (mg/L)	--	100

D. Rearing Pond or Raceway Drawdown for Release Discharges

Parameter	Instantaneous Maximum
Settleable Solids (mL/L)	1.0
Total Suspended Solids (mg/L)	100

Pond drawdown for reasons other than fish release shall be subject to the effluent limits in S2.B. of this permit.

E. Rearing Vessel Disinfection Water

Parameter	Instantaneous Maximum
Total Residual Chlorine (µg/L) <sup>1</sup>	19.0

<sup>1</sup> This limit applies to all active halogens used for disinfection (e.g. chlorine, bromine, iodine, and hypochlorite).

F. Prohibitions

The Permittee shall not discharge or release Atlantic salmon (Salmo salar) to any surface waters of the state without written approval from the Director of the Washington State Department of Fish and Wildlife.

The discharge of any pollutant not specifically authorized by this permit in concentrations which violate receiving water quality standards established under Section 307(a) of the Clean Water Act or Chapter 173-201A WAC, shall also be a violation of this permit and the Clean Water Act.

G. Discharges to Impaired Waterbodies

The Permittee's discharge must not cause or contribute to an excursion of the State's water quality standards, including the State's narrative criteria for water quality. For 303(d) listings based on numeric water quality criteria, Permittees must comply with the State's water quality standard for each pollutant named as a pollutant causing a violation of water quality standards at the location named on the State's 303(d) list except for temperature and fecal coliform which are only required if there is a potential source from the hatchery. Permittees must be in compliance with any applicable Total Maximum Daily Load (TMDL) determination.



### S3. TESTING SCHEDULE

Flow measurements and samples shall be collected and analyzed as described in the site specific Sampling Plan (S4.A) according to the following schedules.

#### A. Rearing Pond or Raceway Discharges

Flow-Through Settling Rearing Pond or Raceway Discharges, and all other discharges except Offline Settling Basin Discharges and Rearing Pond or Raceway Drawdown for Fish Release Discharges.

Parameter	Sample Point <sup>a</sup>	Sampling Frequency	Type of Samples <sup>d</sup>
Flow (MGD)	I or E	2/month	Daily total, calculated
Settleable Solids (net ml/L)	I&E	1/week	Grab <sup>b</sup>
Total Suspended Solids (net mg/L)	I&E	1/month	Composite <sup>c</sup>

*I = Hatchery or rearing facility influent. The collection of this measurement for solids analysis is optional if the Permittee chooses to represent the influent measurement as zero concentration. Influent and effluent solids must be characteristically similar to use net calculations.*

*E = Hatchery or rearing facility effluent prior to mixing with the receiving waters or any other flow.*

<sup>a</sup> *Refer to site specific Sampling Plan for appropriate sampling locations.*

<sup>b</sup> *For reporting net settleable solids, influent and effluent grab samples are to be taken on the same day. Effluent sample shall be taken during rearing pond or raceway cleaning. If the frequency of rearing pond or raceway cleaning is less than twice per week, settleable solids sample may be collected immediately following fish feeding. The influent sample concentration shall be considered to be zero if the sample was not collected and/or analyzed. Net values will be accepted if both influent and effluent sample values are reported on the DMR form.*

<sup>c</sup> *Total suspended solids influent sample shall be a flow proportional composite sample of all influent water sources. Total suspended solids effluent sample shall be a combination of at least six representative grab samples collected throughout the normal working day. At least one sample shall be collected while the fish are being fed and another during rearing pond or raceway cleaning. Equal volumes of each of the six grab samples shall be combined and shall constitute the total suspended solids composite sample. The same total suspended solids composite sample may be used for determining compliance with the monthly average and the maximum daily limits. If necessary, additional composite sample(s) may be taken to calculate compliance with the monthly average limit.*

<sup>d</sup> All effluent grab samples shall be representative samples of all outfalls which discharge rearing pond or raceway water to waters of the state.

<sup>e</sup> For reporting net values, the Permittee must report influent and effluent values on the DMR form. The Department may require further characterization of the influent and effluent solids to demonstrate comparability. Influent and effluent total volatile suspended solids (TVSS) analysis can be used to determine comparability.

## B. Offline Settling Basin Discharges

Offline settling basin discharges shall be monitored at the sampling frequency specified in the following table during every month that there is a discharge from the settling basin.

Parameter	Sample Point <sup>a</sup>	Sampling Frequency <sup>d</sup>	Type of Samples <sup>c</sup>
Flow (GPD)	EW	1/week <sup>b</sup>	Daily Total
Settleable Solids (ml/L)	EW	1/month <sup>b</sup>	Grab
Total Suspended Solids (mg/L)	EW	1/month <sup>b</sup>	Grab

EW = Offline settling basin effluent sample taken prior to mixing with any other hatchery or rearing flows or receiving waters.

<sup>a</sup> Refer to site specific Sampling Plan for sampling locations.

<sup>b</sup> If the offline settling basin discharges less frequently than 1/week, the testing frequency for flow shall be the offline settling basin discharge frequency. Testing of the offline settling basin discharge is unnecessary if the basin does not discharge during a reporting period. "No Discharge" shall be noted in the comments section on the DMR form.

<sup>c</sup> Offline settling basin effluent samples shall be collected during the last quarter of a rearing pond or raceway cleaning event. (For batch type settling basins, a representative sample of the effluent shall be taken at the time of discharge.)

<sup>d</sup> Offline settling basin discharges shall be monitored 12 months out of the year if there is a discharge, regardless of pounds of fish on station.

C. Rearing Pond or Raceway Drawdown for Fish Release Discharges

Samples for rearing pond drawdown for fish release shall be collected regardless of pounds of fish on-hand.

The rearing pond drawdown for fish release effluent limits do not apply to pond drawdown for purposes other than fish release. Pond drawdown for reasons other than fish release shall be subject to the effluent limits in S2.A of this permit.

Parameter	Sample Point <sup>a</sup>	Sampling Frequency <sup>c</sup>	Type of Samples <sup>b</sup>
Settleable Solids (mL/L)	E	1/drawdown	Grab
Total Suspended Solids (mg/L)	E	1/drawdown	Grab

*E = Effluent. Rearing pond or raceway effluent grab sample to be taken prior to mixing with receiving waters or any other flow.*

<sup>a</sup> *See site specific Sampling Plan for appropriate sampling locations.*

<sup>b</sup> *Rearing pond drawdown for fish release sample(s) shall be collected during the last quarter of the volume of the rearing pond or raceway drawdown for release event. If multiple raceways or rearing ponds are being released at the same time, grab samples from individual discharges may be combined into a flow proportional composite sample for analysis.*

D. Rearing Vessel Disinfection Water

Water chlorinated for rearing vessel disinfection shall be neutralized in such a manner that the total residual chlorine is less than 19 µg/Liter. Rearing vessel disinfection water shall be tested before it may be discharged to surface waters of the state. Acceptable chlorine tests are:

1. Amperometric Titration, Method 408C; Standard Methods for the Examination of Water and Wastewater.
2. DPD Colormetric field test kit based on Method 4500-CL G.
3. Analytical results for halogen based disinfectants other than chlorine shall be reported as the equivalent concentration of chlorine.

#### **S4. MONITORING AND REPORTING REQUIREMENTS**

##### **A. Facility Sampling Plan**

Each facility shall develop a site specific Sampling Plan, using the figures in Appendix A as guidance. The plan shall include a description of all discharge points (outfalls) to surface water, or land, a description of the ponds or raceways that contribute to each discharge point, flow measurement for each outfall, and how flow is measured or calculated. If grab samples from different outfalls are to be combined into a composite sample for analysis, the plan shall include how a flow proportional composite sample will be compounded from the individual grab samples.

The plan shall also describe the source(s) of water for the influent and the receiving water(s).

The Facility Sampling Plan shall be submitted to the Department by January 1, 2006. The plan may be combined with the Solid Waste Management Plan (S6) and the Pollution Prevention Plan (S7) and submitted together by January 1, 2006.

##### **B. Representative Sampling**

Effluent samples taken in compliance with the monitoring and testing requirements established in this permit shall be collected from the effluent stream prior to discharge into the receiving waters. Influent samples shall be taken at the point where the water enters the facility or settling pond. Samples and measurements shall be representative of the volume and nature of the monitored parameters, including representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions affecting effluent quality.

Facilities shall sample at the locations designated in their site specific Sampling Plan (S4.A).

##### **C. Test Procedures**

All sampling and analytical methods used to meet the monitoring requirements specified in this permit shall conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136 or to the latest revision of *Standard Methods for the Examination of Water and Wastewater* (APHA), unless otherwise specified in this permit or approved in writing by the Department.

D. Flow Measurement

Appropriate flow measurements devices and methods consistent with accepted aquaculture practice shall be selected and used to ensure the accuracy and reliability of measurements of the quantity of monitored flows. The devices shall be installed, calibrated (if appropriate), and maintained to ensure that accuracy of the measurements is consistent with accepted industry standard for that type of device. Frequency of calibration shall be in conformance with the manufacturer's recommendation (where applicable) and at a minimum frequency of at least one calibration per year. Calibration records shall be maintained for at least three years.

E. Use of Accredited Laboratories

All monitoring data, except for flow, temperature, settleable solids, conductivity, pH, and internal process control parameters, shall be prepared by a laboratory registered or accredited under the provisions of, Accreditation of Environmental Laboratories, Chapter 173-50 WAC. Conductivity and pH shall be accredited if the laboratory must otherwise be registered or accredited.

F. Operational Log

1. The Permittee shall keep records on all disease control chemicals used at the facility. All variances from the disease control chemical use procedures contained in the facility Pollution Prevention Plan shall be noted. These records shall include:
  - a. Person responsible for the administration of the disease control chemical if different from the individual identified in the facility Pollution Prevention Plan.
  - b. The date of application of the disease control chemical used. For disease chemicals that are used on a routine basis the frequency of application may be recorded in place of each individual application date.
  - c. The trade name of the disease control chemical used.
  - d. The pond or raceway treatment concentration of the active ingredient, duration of treatment, and amount in gallons or pounds of the chemical.
  - e. The estimated concentration of the active ingredient in the hatchery or rearing facility effluent at the point of discharge to the receiving waters.
  - f. The reason for use and method of application.
  - g. The quantity, type (trade name), method of disposal, and location of any disposed spent chemical dip solutions.

2. The Permittee shall keep records on the average loading in pounds of fish and the total amount of food fed in pounds for each calendar month at the facility. The Permittee shall provide a copy of loading and feeding records to the Department upon request.
3. The information contained in the Operational Log will be used to complete the disease control chemical use reporting requirements as noted in Section S4.H.2. below.

#### G. Additional Monitoring by the Permittee

If the Permittee monitors any pollutant regulated in this permit more frequently than required by this permit, using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR. Such increased frequency shall also be indicated.

#### H. Reporting Requirements

1. Results obtained from the testing required in Section S3 of this permit shall be summarized on a monthly discharge monitoring report (DMR) form supplied by or approved by the Department. The three (3) monthly reports shall be submitted quarterly. The quarterly reporting periods shall be January through March, April through June, July through September, and October through December. Reports shall be submitted quarterly and are to be postmarked by the 30<sup>th</sup> day of the month following the quarterly reporting period.

The average pounds of fish on station and the pounds of food fed during the calendar month shall be reported on the DMR form in the space provided. If net values are calculated, both influent and effluent values must be reported on the form, in addition to the calculated net value.

If there are no discharges for the month, mark the correct DMR space as “no discharge” and provide an explanation in the comment section, if appropriate.

Violations of permit conditions shall be reported to the Department as soon as the Permittee becomes aware of the violation (G3).

2. The Permittee shall also report the use of any disease control chemicals on a form supplied by the Department. The Disease Control Chemical Use Report shall be submitted annually, unless the Department requests this information on a more frequent basis. Each annual report shall cover the amounts of chemicals used during the previous year. Each annual report shall be post marked by the 30<sup>th</sup> day of January following the annual reporting period.

3. Discharge Monitoring Reports, Disease Control Chemical Use Reports, and all other reports and noncompliance notifications shall be submitted to the address indicated below for the respective location of the permitted upland fin-fish facility.

**Northwest Regional Office**

(425) 649-7000

Department of Ecology

3190 - 160th Avenue SE

Bellevue, WA 98008-5452

*For: King, Whatcom, Skagit, Snohomish,  
San Juan, Kitsap, and Island Counties*

**Southwest Regional Office**

(360) 407-6300

Department of Ecology

P.O. Box 47775

Olympia, WA 98504-7775

*For: Thurston, Clallam, Jefferson, Grays  
Harbor, Mason, Pierce, Lewis, Skamania,  
Wahkiakum, Cowlitz, Clark, and Pacific Counties.*

**Central Regional Office**

(509) 575-2490

Department of Ecology

106 South 6th Avenue

Yakima, WA 98902-3387

*For: Yakima, Benton, Klickitat, Chelan,  
Douglas, Kittitas, and Okanogan  
Counties*

**Eastern Regional Office**

(509) 329-3400

Department of Ecology

North 4601 Monroe, Suite 100

Spokane, WA 99205-1295

*For: Spokane, Grant, Adams, Whitman,  
Ferry, Franklin, Stevens, Pend Oreille,  
Garfield, Columbia, Asotin, Lincoln, and  
Walla Walla Counties.*

## **S5. OPERATING REQUIREMENTS AND CONDITIONS**

The following requirements and conditions shall apply to all facilities covered under this permit.

### **A. General Operating Requirements**

1. Sand, silt, mud, solids, sludges, filter backwash, debris, or other pollutants deposited or removed in the course of treatment or control of water supply and wastewaters shall be disposed of in a manner so as to prevent such materials or leachate from such materials entering waters of the state, including ground water.
2. Discharging untreated cleaning wastes (e.g., obtained from a vacuum or standpipe bottom drain system) to waters of the state (including ground water) without prior treatment is prohibited.
3. Sweeping or intentionally discharging accumulated solids from raceways or ponds to waters of the state without prior treatment is prohibited.
4. Practices such as removing dam boards in raceways or ponds that allow accumulated solids to be discharged to waters of the state are prohibited.

5. Rearing ponds and raceways shall be cleaned within one week prior to drawdown for fish release, where practical.
6. During all phases of operation of the facility, the Permittee shall implement all aspects of the Pollution Prevention Plan required in Section S6.
7. A copy of this permit must be kept at the facility at all times and made available to all employees and to the Department upon request.
8. Fish mortalities, egg taking, or processing wastes shall be disposed of in a manner so as to prevent such materials, including leachate, from entering the waters of the state.
9. Permittees with fin-fish rearing facilities supplied with ground water and discharging to surface receiving waters will, to the greatest extent feasible, conduct phased reductions in the amount of water discharged prior to complete shut down.
10. The discharge of floating solids to surface waters shall be prevented to the extent possible.
11. At all times the permitted discharges shall comply with applicable water quality standards.

**B. Disease Control Chemicals**

Unless approved by the Department, only disease control chemicals approved for hatchery use by the United States Food and Drug Administration (USFDA) or the United States Environmental Protection Agency (USEPA) may be used. USFDA approved Investigational New Animal Drugs (INADs) may be used at a facility provided the conditions detailed in a facility's INAD permit application are met and the use is reported on the disease control chemical use form required in Section S4.H.2. All disease control chemical use must be done in conformance with product label instructions or approved INAD protocols, or be administered by a licensed veterinarian. The disposal of all spent chemical dip treatment solutions shall be documented in the Operational Log in accordance with the provisions of S4.F.

**1. Non-Emergency Extra-Label Drug and Chemical Use**

The Department recognizes that there are many situations where the extra-label use of disease control chemicals could occur with little or no reasonable potential to impact water quality. As a result, the following use of disease control chemicals or drugs administered by or under the supervision of a licensed veterinarian is approved by the Department of Ecology:

- a. Any drug or chemical administered through injection;



- b. Any drug or chemical administered by the use of a dip;
- c. Any drug or chemical administered as an additive to feed; and
- d. Any drugs classified by USFDA as a low priority aquaculture drug (Appendix 2).

## 2. Emergency Drug and Chemical Use

The Department recognizes that an emergency epizootic disease may require the use of a drug or chemical not approved by either the USFDA or the USEPA, and not in conformance with S5.B.1. above.

The use of disease control chemicals not otherwise approved by the Department is approved for the treatment of an emergency epizootic disease provided:

- a. The drug or disease control chemical is administered by or under the direct supervision of a licensed veterinarian;
- b. The drug or disease control chemical used and/or the method of its application could not have reasonably been anticipated; and
- c. Written or facsimile notification is provided to the appropriate Department of Ecology Regional Office 24 hours prior to administering the drug or disease control chemical.

Notwithstanding the provisions of Section S5.B, the Permittee is responsible for fully complying with all the terms and conditions in the General Permit for Upland Fin-Fish Hatching and Rearing Facilities including, but not limited to monitoring, recordkeeping, and reporting. Further, this clarification of disease control chemicals use does not authorize the Permittee to violate or cause an exceedance of applicable water quality standards.

## C. Production Changes

- 1. The Permittee shall notify the Department of any proposed production increases or changes in the nature of the discharge which substantially deviates from the information submitted in the permit application.
- 2. If the pounds of fish on hand for a facility drops below 20,000 pounds and the monthly pounds of food fed for a month is less than 5,000 pounds, the Permittee shall continue submitting DMRs to the Department, but may, for those months, suspend the testing requirements contained in Section S3.A, Rearing Pond or Raceway Discharges until the facility again exceeds the above biomass or feeding rate thresholds.

Permittees shall note on the DMR comment and explanation section the reason(s) monitoring information was not submitted (i.e. monthly pounds of fish on hand below 20,000 pounds and less than 5,000 pounds of fish food was fed). Nothing in this section shall relieve the Permittees of the testing requirements of S3.B, Offline Settling Basin Discharges, or S3.C, Rearing Pond or Raceway Drawdown for Fish Release Discharges.

## **S6. SOLID WASTE MANAGEMENT**

### **A. Solid Waste Handling**

The Permittee shall handle and dispose of all solid waste material in such a manner as to prevent its entry into state ground or surface water.

### **B. Leachate**

The Permittee shall not allow leachate from its solid waste material to enter state waters without providing all known, available, and reasonable methods of treatment (AKART), nor allow such leachate to cause violations of the State Surface Water Quality Standards, Chapter 173-201A WAC, or the State Ground Water Quality Standards, Chapter 173-200 WAC.

### **C. Solid Waste Management Plan**

The Permittee shall prepare a Solid Waste Management Plan and submit it to the appropriate regional office of the Department no later than January 1, 2006. This plan shall include all solid wastes with the exception of those solid wastes regulated by Chapter 173-303 WAC (Dangerous Waste Regulations). The plan shall include how solid and biological wastes are collected, stored, and disposal methods. Among the solid wastes of concern are:

1. Sands, silts, and other debris collected from facility source waters.
2. Accumulated settled solids in rearing ponds and settling ponds.
3. Any fish mortalities under normal hatchery operation.
4. Fish mortalities due to a fish kill involving more than five percent of the fish in any raceway or pond, or due to kill spawning operations.
5. Blood from kill spawning or harvesting operations.
6. Floating debris removed from ponds and raceways.

A copy of the Solid Waste Management Plan shall be kept on site and followed by all hatchery personnel. This plan shall not be at variance with any approved local Solid Waste Management Plan. Any proposed revision or modification of the plan must be submitted to the Department of Ecology and the local Health Department (if applicable). The Permittee shall comply with the plan and any modifications thereof.

The Solid Waste Management Plan shall be submitted to the Department of Ecology and the local Health District by January 1, 2006. The plan may be combined with the Facility Sampling Plan (S.4.A.) and the Pollution Prevention Plan (S.7) and submitted together by January 1, 2006.

## **S7. POLLUTION PREVENTION PLAN**

The Permittee shall prepare or update the site specific Pollution Prevention Plan and submit it to the Department by January 1, 2006. This plan shall address operating, spill prevention, spill response, and stormwater discharge practices that will prevent or minimize the release of pollutants from the facility to the waters of the state.

The Permittee shall review the Pollution Prevention Plan for how effective it has been in achieving the goals of minimizing the discharge of pollutants to waters of the state within the first six months after permit coverage has been granted. The Permittee shall review the plan following any significant discharge of pollutants and revise the plan as needed. Any proposed revision or modification of the Pollution Prevention Plan must be submitted to the Department within 30 days of plan revision. The Permittee shall comply with the plan and any modifications thereof. The Permittee shall operate the facility in accordance with this plan along with any subsequent amendments or revisions.

The Permittee shall maintain a copy of the most current version of the Pollution Prevention Plan at the facility and assure that its operations staff for the facility are familiar with the plan and have been adequately trained in the specific procedures that it requires.

The Permittee shall address the following in the Plan:

- A. How fish feeding will be conducted to minimize the discharge of unconsumed food.
- B. The frequency of pond and raceway cleaning and what procedures will be used to determine when cleaning is necessary to prevent accumulated solids from being discharged.
- C. How pond and raceway cleaning will be performed to reduce the disturbance and subsequent discharge of settled solids during cleaning events.
- D. How fish grading, harvesting, and other activities within ponds or raceways will be carried out to minimize the disturbance and subsequent discharge of accumulated solids.

- E. For facilities that release fish for enhancement purposes, how the discharge of accumulated solids will be prevented during the fish release.
- F. How disease control chemicals are used within the facility to ensure that the amounts and frequency of application are the minimum necessary for effective disease treatment and control. The concentration of disease control chemicals in the facility's discharge shall be minimized to the maximum extent practicable.
- G. Practices for the storage and, if necessary, disposal of disease control chemicals.
- H. Procedures to prevent or respond to spills and unplanned discharges of oil and hazardous materials. These procedures shall address the following:
  - 1. A description of the reporting system which will be used to alert responsible facility management and appropriate legal authorities.
  - 2. A description of facilities (including an overall facility site plan) which prevent, control, or treat spills and unplanned discharges and compliance schedule to install any necessary facilities in accordance with the approved plan.
  - 3. A list of all hazardous materials used, processed, or stored at the facility that may be spilled directly or indirectly into state waters.
- I. Procedures to identify and prevent existing and potential sources of stormwater pollution.

The Pollution Prevention Plan shall be submitted to the Department by January 1, 2006. The plan may be combined with the Facility Sampling Plan (S4.A.) and the Solid Waste Management Plan (S6) and submitted together by January 1, 2006.

## **GENERAL CONDITIONS**

### **G1. DISCHARGE VIOLATIONS**

The Permittee shall at all times be responsible for continuous compliance with the terms and conditions of this general permit. All discharges and activities authorized by this general permit shall be consistent with the terms and conditions of this general permit. The discharge of any pollutant more frequently, or at a concentration in excess of, or at an application rate exceeding that authorized by this general permit shall constitute a violation of the terms and conditions of this general permit unless such discharges are covered under another discharge permit. The Permittee shall be responsible for compliance with any order, directive, or penalty issued by the Department.

### **G2. PROPER OPERATION AND MAINTENANCE**

The Permittee shall at all times properly operate and maintain any facilities or systems of control to achieve compliance with the terms and conditions of the general permit. Where design criteria have been established, the Permittee shall not allow flows or waste loadings to exceed approved design criteria or approved revisions thereto.

### **G3. NONCOMPLIANCE NOTIFICATION**

If for any reason the Permittee does not comply with, or will be unable to comply with, any of the discharge limitations or other conditions specified in this general permit, the Permittee shall, at a minimum, provide the Department with the following information:

- A. A description of the nature and cause of noncompliance, including the quantity and quality of any unauthorized waste discharges.
- B. The period of noncompliance, including exact dates and times and/or the anticipated time when the Permittee will return to compliance.
- C. The steps taken, or to be taken, to reduce, eliminate, and/or prevent recurrence of the noncompliance.

In addition, the Permittee shall:

- A. Take immediate action to stop, contain, and clean up any unauthorized discharges.
- B. Take all reasonable steps to minimize any adverse impacts to waters of the state and correct the problem.
- C. Notify the Department, by telephone, so that an investigation can be made to evaluate any resulting impacts and the corrective actions taken to determine if additional action should be taken.

In the case of any discharge subject to any applicable toxic pollutant effluent standard under Section 307(a) of the Clean Water Act, or which could constitute a threat to human health, welfare, or the environment, 40 CFR Part 122.41 requires that the information specified in this general condition shall be provided not later than twenty-four (24) hours from the time the Permittee becomes aware of the circumstances. If this information is provided orally, a written submission covering these points shall be provided within five (5) days of the time the Permittee becomes aware of the circumstances unless the Department waives or extends this requirement on a case-by-case basis. Noncompliance notifications shall be made to the appropriate Ecology regional office in Section S4.H.3 of this permit. Compliance with any of these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this general permit or the resulting liability for failure to comply.

#### **G4. BYPASS PROHIBITED**

The intentional bypass of wastes from all or any portion of a collection, treatment, disposal, or control facility or system is prohibited unless the following four conditions are met:

- A. The bypass is: (1) unavoidable to prevent loss of life, personal injury, or severe property damage; or (2) necessary to perform construction or maintenance-related activities essential to meet the requirements of the Clean Water Act and authorized by administrative order.
- B. There are no feasible alternatives to bypass such as: (1) the use of auxiliary collection, treatment, and/or pollution control facilities/systems; (2) retention of untreated wastes; (3) maintenance during normal periods of equipment down time; or (4) temporary reduction or termination of production.
- C. The Permittee submits notice of an unanticipated bypass to the Department in accordance with Condition G3. Where the Permittee knows or should have known in advance of the need for a bypass, this prior notification shall be submitted for approval to the Department, if possible, at least 30 days before the date of bypass.
- D. The bypass is allowed under conditions determined to be necessary by the Department to minimize any adverse effects. The public shall be notified and given an opportunity to comment on bypass incidents of significant duration, to the extent feasible.

The Department will approve or deny the request to bypass by administrative order under RCW 90.48.120.

## **G5. RIGHT OF ENTRY**

The Permittee shall allow an authorized representative of the Department, upon the presentation of credentials and such other documents as may be required by law, at reasonable times:

- A. To enter upon the Permittee's premises in which a discharge is located or where any records are required to be kept under the terms and conditions of this general permit;
- B. To have access to and to copy at reasonable costs, any records required to be kept under terms and conditions of the permit;
- C. To inspect any monitoring equipment or method of monitoring required in this general permit;
- D. To inspect any collection, treatment, pollution management, or discharge facilities; and/or
- E. To sample any discharge of pollutants. If the sampling of influent or internal hatchery waters is necessary, the Permittee will be provided the opportunity to collect the required sample.

Alternate right of entry standards and 72 hour pre-notification requirements due to USDA/AHIS disease-free status, must be adhered to at facilities that follow this protocol.

## **G6. NOTIFICATION OF CHANGE IN COVERED ACTIVITIES**

The Permittee shall notify the Department when facility expansions, production increases, or process modifications will (1) result in new or substantially increased discharges of pollutants or a change in the nature of the discharge of pollutants or (2) violate the terms and conditions of this general permit.

## **G7. REVOCATION OF COVERAGE**

Pursuant to Chapter 43.21B RCW and Chapter 173-226 WAC, the Director may require any discharger authorized by this general permit to apply for and obtain coverage under an individual permit or another more specific and appropriate general permit. Cases where revocation of coverage may be required include, but are not limited to the following:

- A. Violation of any term or condition of this general permit;
- B. Obtaining coverage under this general permit by misrepresentation or failure to disclose fully all relevant facts;
- C. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

- D. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090; unless otherwise overturned by Findings of Fact, Conclusions of Law and Order PCHB No. 02-056.
- E. A determination that the permitted activity endangers human health or the environment, or significantly contributes to water quality standards violations;
- F. Nonpayment of permit fees or penalties assessed pursuant to RCW 90.48.465 and Chapter 173-224 WAC;
- G. Failure of the Permittee to satisfy the public notice requirements of WAC 173-226-130(5), when applicable.
- H. Facilities that discharge to a waterbody that is either 303(d) listed or part of a completed TMDL (Total Maximum Daily Load) assessment, and require additional monitoring or limits.

Permittees who have their coverage revoked for cause according to WAC 173-226-240 may request temporary coverage under this permit during the time an individual permit is being developed, provided the request is made within 90 days from the time of revocation and is submitted along with a complete individual permit application form.

#### **G8. GENERAL PERMIT MODIFICATION OR REVOCATION**

General permits may be modified, or revoked and reissued, in accordance with the provisions of Chapter 43.21B RCW and Chapter 173-226 WAC. Grounds for modification or revocation and reissuance include, but are not limited to, the following:

- A. When a change that occurs in the technology or practices for control or abatement of pollutants applicable to the category of dischargers covered under this general permit.
- B. When effluent limitation guidelines or standards are promulgated pursuant to the FWPCA or Chapter 90.48 RCW for the category of dischargers covered under this general permit.
- C. When a water quality management plan containing requirements applicable to the category of dischargers covered under this general permit is approved.
- D. When information is obtained which indicates that cumulative effects on the environment from dischargers covered under this general permit are unacceptable.



## **G9. REPORTING A CAUSE FOR MODIFICATION OR REVOCATION OF COVERAGE**

A Permittee who knows or has reason to believe that any activity has occurred or will occur which would constitute cause for modification or revocation under Condition G7 or 40 CFR 122.62 shall report such information to the Department so that a decision can be made on whether action to revoke coverage under this general permit will be required. The Department may then require submission of a new Application for Coverage under this or another general permit or an application for an individual permit. Submission of a new application does not relieve the Permittee of the duty to comply with all the terms and conditions of the existing general permit until the new application for coverage has been approved.

## **G10. TRANSFER OF PERMIT COVERAGE**

Coverage under this general permit is automatically transferred to a new discharger if:

- A. A written signed agreement between the old and new discharger containing a specific date for transfer of permit responsibility and coverage is submitted to the department; and
- B. The Department does not notify the old and new discharger of its intent to revoke coverage under the general permit. If this notice is not given, the transfer is effective on the date specified in the written agreement between the old and new discharger.

## **G11. TOXIC POLLUTANTS**

If any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Clean Water Act for a toxic pollutant and that standard or prohibition is more stringent than any limitation upon such pollutant in this general permit, the Department shall institute proceedings to modify or revoke and reissue this general permit to conform to the new toxic effluent standard or prohibition.

## **G12. OTHER REQUIREMENTS OF TITLE 40 CODE OF FEDERAL REGULATIONS**

All other applicable requirements of 40 CFR 122.41 and 122.42 are incorporated in this general permit by reference.

## **G13. COMPLIANCE WITH OTHER LAWS AND STATUTES**

Nothing in the permit shall be construed as excusing the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

#### **G14. ADDITIONAL MONITORING REQUIREMENTS**

The Department may establish specific monitoring requirements in addition to those contained in this general permit by administrative order or permit modification.

#### **G15. REMOVED SUBSTANCES**

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or pollution control of wastewaters shall not be resuspended or reintroduced to the final effluent stream for discharge to state waters. Such removed substances shall be lawfully disposed in an appropriate manner and shall comply with Chapter 173-303 WAC and Chapter 173-304 WAC.

#### **G16. RECORD KEEPING REQUIREMENTS**

The Permittee shall maintain records of all information resulting from any activities, including monitoring activities required as a condition of the application for or as a condition of coverage under this general permit. Records of monitoring activities and results shall include for all samples:

- A. The date, exact place, and time of sampling.
- B. The individual who performed the sampling or measurement.
- C. The dates analyses were performed.
- D. Who performed the analyses.
- E. The analytical techniques/methods used.
- F. The results of such analyses.

The Permittee shall retain for a minimum of five (5) years any records of monitoring activities and results including all original strip chart recordings for continuous monitoring instrumentation and calibration and maintenance records.

This period of retention shall be extended during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by the Department or regional administrator.

#### **G17. SIGNATORY REQUIREMENTS**

All applications, reports, or information submitted to the Department shall be signed and certified.

- A. All permit applications shall be signed by either a responsible corporate officer of at least the level of vice president of a corporation, a general partner of a partnership, or the proprietor of a sole proprietorship.
- B. All reports required by this permit and other information requested by the Department shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
  - 1. The authorization is made in writing by a person described above and submitted to the Department.
  - 2. The authorization specifies either an individual or a position having responsibility for the overall operation of a regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)
- C. Changes to authorization. If an authorization under paragraph B.2., above, is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph B.2., above, must be submitted to the Department prior to or together with any reports, information, or applications to be signed by an authorized representative.
- D. Certification. Any person signing a document under this section shall make the following certification:

*“I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiries of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.”*

#### **G18. REQUESTS TO BE EXCLUDED FROM COVERAGE UNDER A GENERAL PERMIT**

Any discharger authorized by this general permit may request to be excluded from coverage under this general permit by applying for an individual permit. The discharger shall submit to the Director an application as described in WAC 173-220-040 or WAC 173-216-070, whichever is applicable, with reasons supporting the request. The Director shall either issue an individual permit or deny the request with a statement explaining the reason for the denial.

## **G19. APPEALS**

The terms and conditions of this general permit:

- A. As they apply to the appropriate class of dischargers are subject to appeal within thirty (30) days of issuance of this general permit in accordance with Chapter 43.21(B) RCW and Chapter 173-226 WAC; and
- B. As they apply to an individual discharger are subject to appeal in accordance with Chapter 43.21(B) RCW within thirty (30) days of the effective date of coverage of that discharger.

Consideration of an appeal of general permit coverage of an individual discharger is limited to the general permit's applicability or non-applicability to that discharger. Appeal of this general permit coverage of an individual discharger shall not affect any other individual dischargers. If the terms and conditions of this general permit are found to be inapplicable to any discharger(s), the matter shall be remanded to the Department for consideration of issuance of an individual permit or permits.

## **G20. DUTY TO REAPPLY**

The Permittee shall reapply for coverage under this general permit at least one hundred and eighty (180) days prior to the specified expiration date of this general permit. An expired general permit continues in force and effect until a new general permit is issued or until the Department cancels it. Only those facilities that have reapplied for coverage under this general permit are covered under the continued permit.

## **G21. TERMINATION OF COVERAGE UPON ISSUANCE OF AN INDIVIDUAL PERMIT**

When an individual permit is issued to a discharger otherwise subject to this general permit, the coverage under this general permit for that Permittee is terminated on the effective date of the individual permit.

## **G22. PENALTIES FOR VIOLATING PERMIT CONDITIONS**

Any violation of the terms and conditions of this general permit, the state Water Pollution Control Act, and the federal Clean Water Act, will be subject to the enforcement sanctions, direct and indirect, as provided for in WAC 173-226-250.

Any person who violates the terms and conditions of this waste discharge permit may incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars for every such violation. Each and every such violation shall be a separate and distinct offense, and in case of a continuing violation, every day's continuance shall be deemed to be a separate and distinct violation.

**G23. SEVERABILITY**

The provisions of this general permit are severable, and if any provision of this general permit, or application of any provision of this general permit to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this general permit shall not be affected thereby.

**G24. PAYMENT OF FEES**

The Permittee shall submit payment of fees associated with this permit as assessed by the Department. The Department may revoke this permit or take enforcement, collection, or other actions, if the permit fees established under Chapter 173-224 WAC are not paid.

## **Appendix 1. Definitions**

Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

Composite Sample shall mean a flow-proportioned mixture of not less than six discrete aliquots. Each aliquot shall be a grab sample of not less than 100 mL and shall be collected and stored in accordance with procedures prescribed in the most recent edition of Standard Methods for the Examination of Water and Wastewater.

Department means Department of Ecology

Director means the Director of the Department of Ecology or his/her authorized representative.

Epizootic means the occurrence of a specific disease which can be detected in fifty percent of the mortality or moribund individual fish in an affected container or within an affected population, and which results in an average daily mortality of at least one-half of one percent of the affected individual fish for five or more days in any thirty-day period.

40 CFR means Title 40 of the Code of Federal Regulations. The Code of Federal Regulations is the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the federal government.

GPD = gallons per day

Grab Sample means an individual discrete water sample.

Lined Pond means asphalt, concrete, plastic membrane or similarly lined ponds. Ponds lined with gravel or soil are considered unlined.

Instantaneous Maximum is the maximum allowable concentration of a pollutant determined from the analysis of any discrete or composite sample collected, independent of the flow rate and the duration of the sampling event.

MGD = million gallons per day

mg/L = milligrams per liter ("Net mg/L" = mg/L in hatchery effluent minus mg/L in hatchery influent)

ml/L = milliliters per liter ("Net ml/L" = ml/L in hatchery effluent minus ml/L in hatchery influent)

Monthly Average shall be calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

New Facility means a facility that begins activities that will result in a discharge or potential discharge to waters of the state on or after the effective date of the general permit.

Offline Settling Basin shall mean those pond cleaning waste treatment systems which have a hydraulic detention time of 24 hours and a designed removal efficiency of at least 85% for total suspended solids and 90% for settleable solids.

Production means net gain in weight of fish at the facility.

Rearing Ponds or Raceways means ponds, raceways, circular ponds, or any other method used to keep fin-fish captive for culture purposes at an upland fin-fish rearing facility.

Rearing Vessel means all rearing ponds, raceways, and fish hauling tanks.

Representative Sample means multiple outfalls with similar waste streams can be sampled and combined into one sample for one analysis. The sample volume from each outfall shall be apportioned according to the volume of flow at the time of sampling. These apportioned samples can then be combined into one representative sample for analysis.

Settleable Solids means those solids in surface waters or wastewaters which are measured volumetrically in accordance with procedures prescribed in the most recent edition of Standard Methods for the Examination of Water and Wastewater.

Section 303(d) List is a part of the federal Clean Water Act that requires states to identify waterbodies that are water quality limited (i.e. waterbodies that do not meet, or are not expected to meet, applicable water quality standards after sources have undergone technology-based controls).

Severe Property Damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays or losses in production.

Surface Waters include lakes, rivers, ponds, streams, inland waters, salt waters, and all other surface waters and water courses within the jurisdiction of the state of Washington. For the purposes of this permit surface waters do not include hatchery ponds, raceways, pollution abatement ponds, and wetlands constructed solely for wastewater treatment.

Total Maximum Daily Load (TMDL) is the sum of all waste load allocations (WLAs) and load allocations (LAs) (non-point source and background) and a safety margin. The TMDL is a mechanism for establishing water quality-based controls on all point and nonpoint sources of pollutants within a water quality-limited basin, subbasin, or hydrographic segment.

TVSS means total volatile suspended solids in the influent or effluent water, which are measured in accordance with procedures prescribed in the most recent edition of Standard Methods for the Examination of Water and Wastewater.

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based, permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

Note – An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of the following paragraph are met:

- A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that:
- 1) an upset occurred and that the Permittee can identify the cause(s) of the upset;
  - 2) the permitted facilities were being properly operated at the time of the upset;
  - 3) the Permittee submitted notice of the upset as required; and
  - 4) the Permittee complied with any remedial measures required under this permit.

In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof.

Waters of the State include those waters defined as "waters of the United States" in 40 CFR 122.2 within the geographic boundaries of Washington State and "waters of the state" as defined in Chapter RCW 90.48 RCW which include lakes, rivers, ponds, streams, waters, underground waters, salt waters, and all other surface water and water courses including wetlands within the jurisdiction of the state of Washington.

Water Quality Standards means the water quality standards for ground waters of the state of Washington (Chapter 173-200 WAC), the water quality standards for surface waters of the state of Washington (Chapter 173-201A WAC), and the sediment management standards of the state of Washington (Chapter 173-204 WAC).



## Appendix 2. Sampling Locations

Figure 1. Off-Line Settling Basin

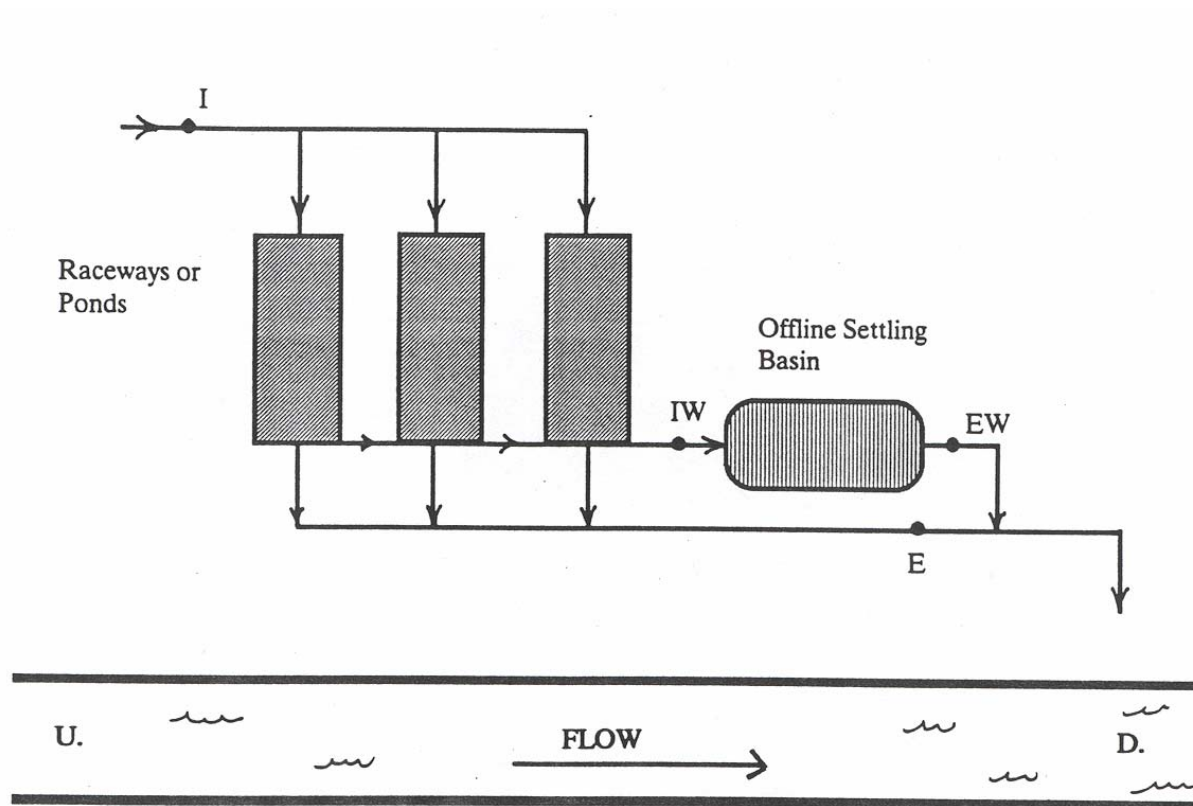


Figure 2. Flow Through Settling Basin

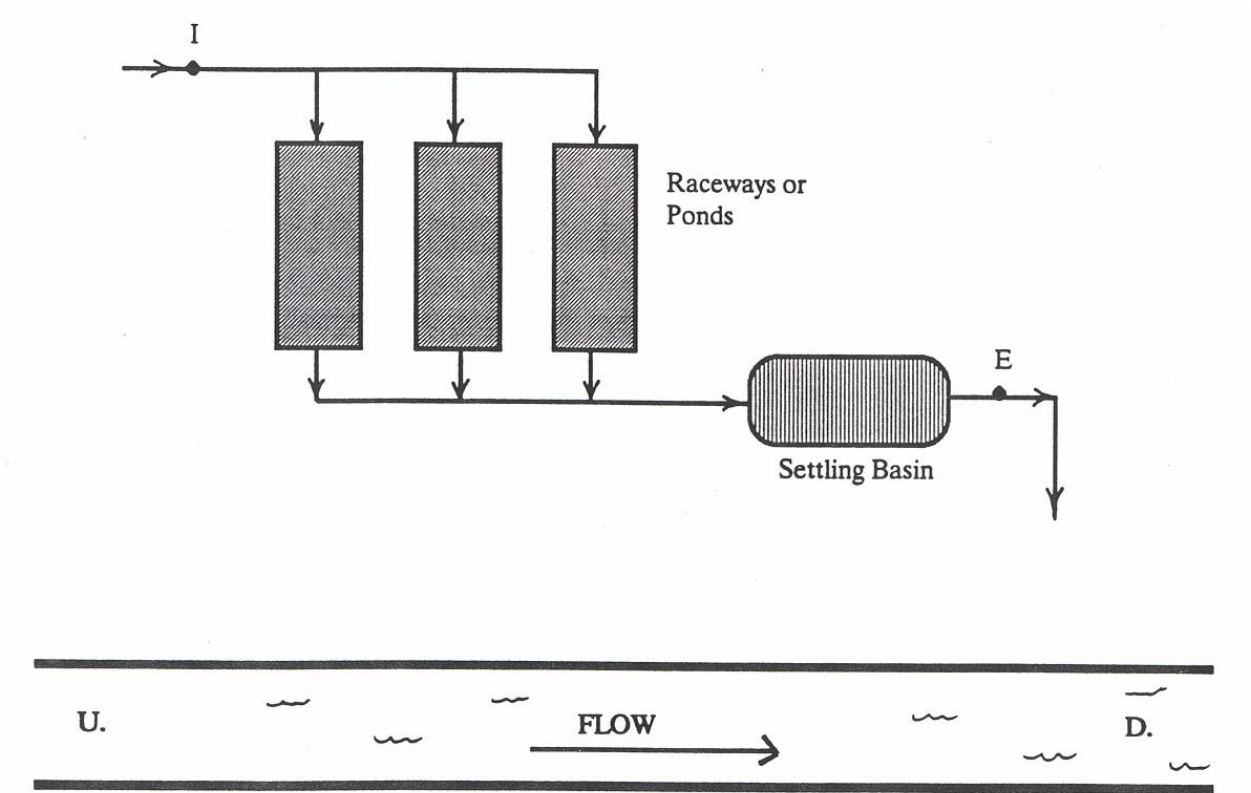
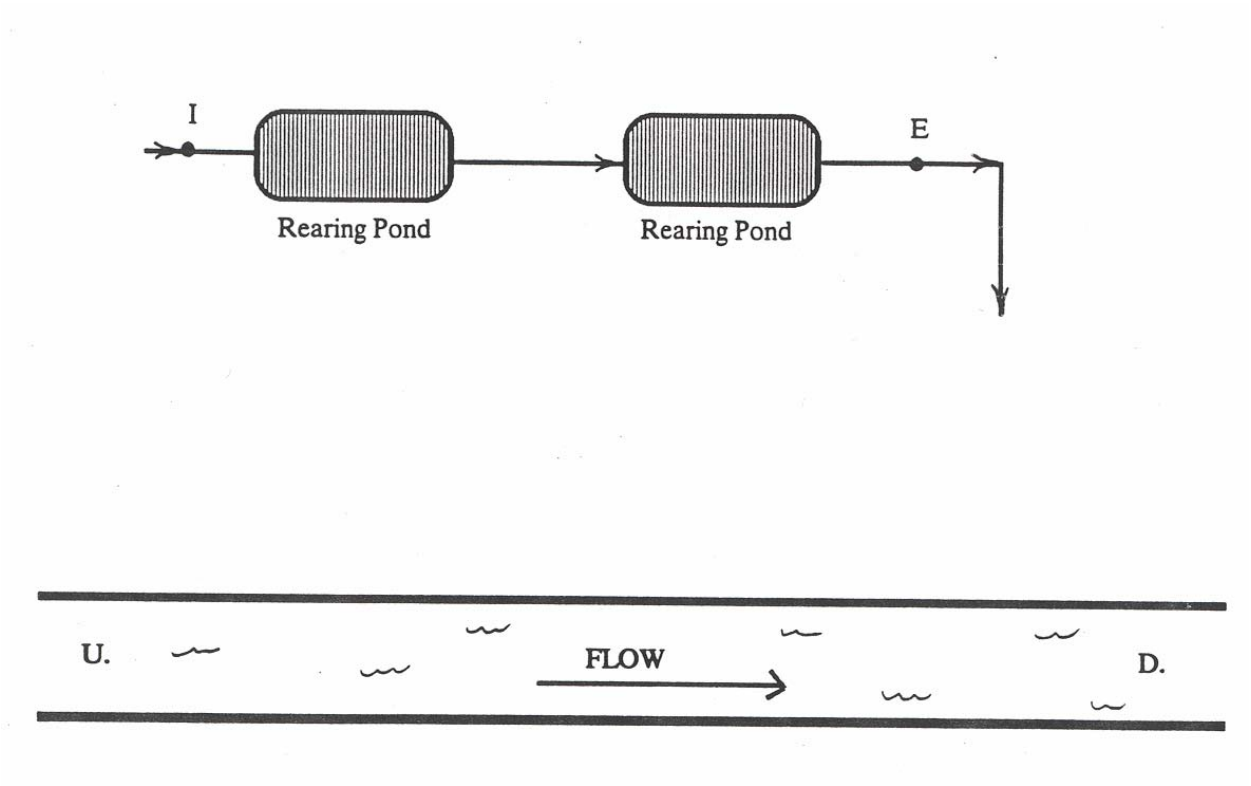


Figure 3. Rearing Pond Culture



### **Appendix 3. Low Regulatory Priority Aquaculture Drugs**

#### **LOW REGULATORY PRIORITY AQUACULTURE DRUGS**

The following compounds have undergone review by the Food and Drug Administration and have been determined to be new animal drugs of low regulatory priority.

ACETIC ACID - 1000 to 2000 ppm dip for 1 to 10 minutes as a parasiticide for fish.

CALCIUM CHLORIDE - Used to increase water calcium concentration to ensure proper egg hardening. Dosages used would be those necessary to raise calcium concentration to 10-20 ppm  $\text{CaCO}_3$ .

- Up to 150 ppm indefinitely to increase the hardness of water for holding and transporting fish in order to enable fish to maintain osmotic balance.

CALCIUM OXIDE - Used as an external protozoicide for fingerlings to adult fish at a concentration of 2000 mg/L for 5 seconds.

CARBON DIOXIDE GAS - For anesthetic purposes in cold, cool, and warm water fish.

FULLER'S EARTH - Used to reduce the adhesiveness of fish eggs to improve hatchability.

GARLIC (Whole Form) - Used for control of helminth and sea lice infestations of marine salmonids at all life stages.

HYDROGEN PEROXIDE - Used at 250-500 mg/L to control fungi on all species and life stages of fish, including eggs.

ICE - Used to reduce metabolic rate of fish during transport.

MAGNESIUM SULFATE - Used to treat external monogenic trematode infestations and external crustacean infestations in fish at all life stages. Used in all freshwater species. Fish are immersed in a 30,000 mg  $\text{MgSO}_4$ /L and 7000 mg  $\text{NaCl}$ /L solutions for 5 to 10 minutes.

ONION (Whole Form) - Used to treat external crustacean parasites, and to deter sea lice from infesting external surface of salmonids at all life stages.

PAPAIN - Use of a 0.2% solution in removing the gelatinous matrix of fish egg masses in order to improve hatchability and decrease the incidence of disease.

POTASSIUM CHLORIDE - Used as an aid in osmoregulation; relieves stress and prevents shock. Dosages used would be those necessary to increase chloride ion concentration to 10-2000 mg/L.

POVIDONE IODINE - 100 ppm solution for 10 minutes as an egg surface disinfectant during and after water hardening.

SODIUM BICARBONATE - 142 to 642 ppm for 5 minutes as a means of introducing carbon dioxide into the water to anesthetize fish.

SODIUM CHLORIDE - 0.5% to 1.0% solution for an indefinite period as an osmoregulatory aid for the relief of stress and prevention of shock; and 3% solution for 10 to 30 minutes as a parasiticide.

SODIUM SULFITE - 15% solution for 5 to 8 minutes to treat eggs in order to improve their hatchability.

THIAMINE HYDROCHLORIDE - Used to prevent or treat thiamine deficiency in salmonids. Eggs are immersed in an aqueous solution of up to 100 ppm for up to four hours during water hardening. Sac fry are immersed in an aqueous solution of up to 1,000 ppm for up to one hour.

UREA and TANNIC ACID - Used to denature the adhesive component of fish eggs at concentrations of 15g urea and 20g NaCl/5 liters of water for approximately 6 minutes, followed by a separate solution of 0.75 g tannic acid/5 liters of water for an additional 6 minutes. These amounts will treat approximately 400,000 eggs.